MEMORANDUM Date: 27-Aug-04

From: Joe Nolan and Jason M. Jones, Section(s) 399-0401

To: Program Officer, MOVES

Via: (1) Thesis Advisor:
(2) Academic Associate: Rudy Darken
(3) Chairman, MOVES: Rudy Darken

Subj: Thesis Report NUMBER 1 <NOTE: Due by end of quarter four>

Encl: (1) Computer Science (MOVES) Thesis Proposal

1. Tentative Title of Proposed Thesis: Games for training: An examination of multi-player commercial "off the shelf" first person shooter games as a low resource, high impact small unit training tool for the infantry squad and platoon.

2. General Area of Proposed Thesis Research: Utilization of multi-player commercial "off the shelf" first person shooter games to conduct small unit collective training.

3. Enclosure (1) is the Thesis Proposal with a milestone plan (dates/events) for research and thesis completion.

4. I expect that my thesis will be unclassified. If classified, I have read Chapter V of NAVPGSCOLINST 5510.2, and the NPS Research Admin web page (http://intranet.nps.navy.mil/ResAdmin/research1.html) concerning Classified Thesis.

5. I anticipate the following travel or other extraordinary requirements: TBD

6. Proposed Co-Advisor: Perry McDowell

7. Co-Advisor Signature: _____

_____, MAJ, U.S. Army
Student Signature

_____ MAJ, U.S. Army
Second Student Signature <if joint thesis>

1. Approved and forwarded: _____ 27 Aug 04
Thesis Advisor Date

2. Approved and forwarded: _____ 27 Aug 04
MOVES Academic Associate Date

3. Approved and forwarded: _____ 27 Aug 04
Chairman, MOVES Date

4. Approved and retained: _____, CDR, USN 27 AUG 04
Program Officer – MOVES Date

COMPUTER SCIENCE (MOVES) THESIS PROPOSAL

A. General Information

1. Name: Joseph M. Nolan, Major, U.S. Army and Jason M. Jones, Major, U.S. Army
2. Email: jmnolan@nps.edu and jmjones@nps.edu
3. Curriculum: MOVES (399)
4. Thesis Advisor: Dr. Rudy Darken, PhD
5. Co-Advisor: Perry McDowell
6. Second Reader: Rich Spainhour, Major, U.S. Army, TRAC-Monterey
7. Academic Associate: Rudy Darken
8. Date of Graduation: September 2005

B. Area of Research

Games for training: An examination of multi-player commercial "off the shelf" first person shooter games (MPCOTSFPSG) as a low resource, high impact small unit training tool for the infantry squad and platoon.

C. Research Questions

1. What are the mission critical collective and leader tasks, and additional lessons learned from OIF & OEF that are essential for training the infantry squad and platoon in the current operating environment?

2. What are the collective and leader tasks essential for training the infantry squad and platoon that can and cannot be trained with a COTS FPS game in a multi-player mode?

3. What metrics and methodology that should be employed to measure the training transfer of using a COTS FPS game in multi-player mode to train the infantry squad and platoon?

4. What are the advantages and disadvantages of using COTS software versus DOD contracted training systems to train the infantry squad and platoon?

5. What recommendations and requirements should be forwarded to the NPS Delta3D team for the development of infantry training software?

6. How should the infantry company and battalion integrate the use of MPCOTSFPSG exercises into their existing live, virtual and constructive training plans?

7. What are the metrics for MPCOTSFPSG selection to use as training tools for the infantry squad and platoon?

D. Discussion

Combat arms units (both Marine and Army) often do not have enough people, time and resources to properly train collective tasks at the squad and platoon level. Resources are often retained by higher headquarters due to tight deployment schedules, land restrictions, logistics constraints and a myriad of other reasons. Due to the current operational demands of combat arms brigades and divisions, the reality of limited resources is often a contributing factor in poor

performance at the squad and platoon level. As operational tempo and transformation of the force continues place demands on limited resources, leaders at all levels will need to look for innovative ways to sustain training levels at the small unit level. Due to Herculean efforts of the Non-Commissioned Officers Corps, individual Soldier and Marine skills continue to be maintained at the highest levels. Additionally, battalions and brigades continue to sustain a strong level of proficiency through use of virtual and constructive simulations. The training gap that exists rests between the skilled individual Soldier or Marine and his higher headquarters. This study aims to demonstrate that MPCOTSFPSG, in conjunction with existing unit training plans, can bridge the gap and provide commanders with a low resource, high impact small unit training tool. The COTS option, versus a resource dependent military contract system, allows for increased mobility (as all major DOD installations have at least 1 computer lab with LAN support), reduced cost at the unit and installation level, and the ability to tap into commercial intellectual reservoir.

E. Scope of the Thesis

The scope of this study is to examine the collective and leader tasks that are required for successful execution of squad and platoon missions (using the Army Training and Evaluation Plan – ARTEP 7-8 Drill), and how those tasks could be trained with the use of a MPCOTSFPSG while members of the unit are executing missions in a virtual environment from individual desktop computer workstations. The endstate of this research study is to provide initial analysis on what collective skills MPCOTSFPSG can be used to train at the infantry squad and platoon level, develop a training model recommendation for the integration of this tool into existing unit plans, and use the findings of the study to develop a requirements document for the NPS Delta3D team for the infantry software module.

F. Methodology

For this study to be successful, it must:

- Clearly define the critical collective tasks required for execution of infantry squad and platoon battle drills IAW ARTEP 7-8 Drill

- Use an existing human factors model to map the tasks that a MPCOTSFPSG can train to the tasks that are critical in the execution of infantry squad and platoon battle drills

- Use an approved metric for performance measurement of a control and test group during the experiment phase

- Select a MPCOTSFPSG platform that can be easily learned by the test subject, provide a virtual environment for the subject's avatars to interact within, and provide a challenging event scenario for the test group to conduct

- Use statistical analysis to determine if the findings for the use of MPCOTSFPSG sustained, improved or decreased unit training levels

This research will be conducted in four phases:

Phase I: Analysis of key collective tasks required for execution of infantry squad and platoon battle drills

Phase II: Mapping the key collective tasks to the MPCOTSFPSG platform

Phase III: Execution of the test experiment

Phase IV: Analysis of the findings and recommendations

During Phase I, analysis will be conducted using the ARTEP 7-8 Drill as a guide to determine the critical collective tasks that are required for successful battle drill execution. Additionally, research of lessons learned from OIF/OEF and a review of current tactics, techniques and procedures from units deployed to Iraq and Afghanistan will be conducted to ensure the skill sets to be examined by this research experiment are contemporary. The selection of the MPCOTSFPSG platform will be conducted during this phase. Tentatively, the game Delta Force: Black Hawk Down – Team Sabre will be used as it provides a common FPS interface for test subjects that is not complex to operate, accurately modeled weapons currently used by infantry units, a multiplayer environment for the subjects to conduct exercises within, and finally, low system requirements for computer workstations. This phase ends with the identification of the key collective/leader tasks required for infantry battle drill execution and selection of a game platform

Phase II will begin with adapting the Fleishman's Human Performance guide to create a new human abilities guide for NPS that is specifically designed to measure military skill sets (i.e. tactical communication). This new Combatant Human Abilities Scale and Evaluation (CHASE) will be used to map the skill sets required for the execution of the key collective/leader tasks required for infantry battle drill execution to the selected game platform. This will be accomplished through the conduct of a local experiment, using test subjects to measure the effectiveness of the game platform to model (or replicate) the cues required for leaders and unit members to execute missions during a battle drill. The results of this local experiment will be used to filter the "alpha" tasks (those to be measured with during the unit level experiment) from the total task list. The "beta" tasks, those in which the game did not accurately provide cues for subject execution, will be used as a preliminary starting point for analysis on what tasks or skills the game cannot be used to train. Description of the conduct of the local experiment for Phase II is TBP. This phase ends with the production of a list of "alpha" and "beta" tasks.

Phase III begins with the development of the unit experiment. The group selection will follow the test experiments of randomness, replication and control. Currently, three courses of action exist for selection of the test and control group.

COA1: USMA Cadets trained with the MPCOTSFPSG as a unit, then measure the performance of the unit (squad or platoon) at the summer 2005 Camp Buckner, NY, training exercise where the cadets will conduct infantry battle drills using the ARTEP 7-8 Drill as the performance measure receiving a T – Trained, P – Practiced, or U – Untrained evaluation.

COA2: U.S. Army OCS candidates trained with the MPCOTSFPSG as a unit, then measure the performance of the unit (squad or platoon) at a culmination training exercise, conducted at Fort Benning, GA, where the candidates will conduct infantry battle drills using the ARTEP 7-8 Drill as the performance measure receiving a T – Trained, P – Practiced, or U – Untrained evaluation.

COA3: U.S. Army Infantry Officer Basic Course (IOBC) 2LTs trained with the MPCOTSFPSG as a unit, then measure the performance of the unit (squad or platoon) at a culmination training exercise, conducted at Fort Benning, GA, where

the 2LTs will conduct infantry battle drills using the ARTEP 7-8 Drill as the performance measure receiving a T – Trained, P – Practiced, or U – Untrained evaluation.

The control group(s) for all three COAs will receive no additional training. The selection of the test/control group is TBD. Phase IIIa of the experiment will have the test subjects conducting two (8) hour training exercises using MPCOTSFPSG. The sessions will include a individual familiarization exercise, a unit familiarization exercise and two mission exercises with operational graphics, maps and overlays (from the game) provided to the unit. Leaders and key members of the unit will be selected at random. The unit's performance will be measured using the ARTEP 7-8 Drill, and all "alpha" and "beta" task performance scores will be recorded. Phase IIIb begins with the deployment of the unit to the field to conduct live battle drill execution. Again, ARTEP 7-8 will be used for unit evaluation, and results recorded. Additionally, test subjects will be required to provide feedback on the usefulness of the training tool and recommendations to help answer the question of requirements for platform selection and future software development. Test subject supervisors will also be queried on the recommendations for MPCOTSFPSG integration into unit training plans. Phase III ends with the data collection and experiment end.

Phase IV begins with the analysis of the data and thesis product production. Also, during this phase, an analysis will be conducted of current MPFPS training system and the MPCOTSFPSG used for the experiment for use in contrasting the two systems. During this phase, development of requirement documents for Delta3D, training integration recommendations for MPCOTSFPSG and metrics for game selection will be produced. This phase ends with the completion of the thesis work, requirements document for Delta3D, and a paper outlining the use of MPCOTSFPSG in infantry squad and platoon training for publication in Infantry magazine, the professional journal for U.S. Army infantrymen.

H. Division of Labor

For each of the major tasks involved in our research, one of us will be the lead with the other providing input and support for that task. Joe will take the lead on identification of the collective tasks to observe; the design, set-up and execution of the experiment; and coordination with external agencies. Jason will lead the work creating the CHASE document and analysis of the data.

H. Chapter Outline

Chapter 1: Introduction

Chapter 2: Background

Chapter 3: Conduct of metric selection for use of experiment selection (Phase I-II)

Chapter 4: Conduct of the Experiment (Phase III)

Chapter 5: Analysis of the results (Phase IV)

Chapter 6: Recommendations, Findings and Conclusion

I. Schedule

1. Literature review:	01 SEP 04 – 01 DEC 04
2. Introduction through Ch 2 (Phase I complete)	27 FEB 05
3. Conduct of local experiment (Phase II complete)	31 MAR 05
4. Conduct of unit level experiment (Phase III complete)	NLT 30 MAY 05
5. Analysis of Data (Phase IV begin)	30 JUN 05
6. Draft thesis checked by thesis processor for format:	31 JUL 05
7. Final Thesis Submission / Signature	20 AUG 05

J. Benefits of Study

This study will provide the initial analysis to demonstrate that MPCOTSFPSG (integrated into a solid training plan), can provide a low resource, high impact small unit training tool to Army and Marine infantrymen. It also lends itself to helping the NPS Delta3D software development team produce a requirements document for the open source game engine, currently under development, to produce an infantry training module. Finally, the results of this study should be compared in future thesis work, to specifically answer the question of the use of the COTS game vice using existing DOD contract systems.

K. Anticipated Travel/Funding Requirements

Depending on the level of unit support, I expect travel to Fort Benning, GA or West Point, NY for the conduct of Phase III (TBD). To ensure the game platform will properly execute in the unit's computer labs, a brief trip to either location may be required during Phase II (March, 2005).

L. Preliminary Bibliography

Training Effectiveness Evaluation of the Full Spectrum Command Game, Scott A. Beal, et.al., U.S. Army Research Institute for the Behavioral and Social Sciences, Fort Benning, GA, January 2004.

Operational Requirements Documents for the Soldier Combined Arms Tactical Trainer, Milestone B Decision, Soldier-CATT, February 17, 2003.

Institute for Simulation and Training Review, University of Central Florida, Spring 2004.

Simulation Operations Quarterly, U.S. Army Simulation Operations Proponent Office, Volume 1, issue 3, Spring/Summer 2004.